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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,191	06/24/2003	Christian Krueger	2000.106800	1018
23720	7590	12/10/2004	EXAMINER	
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			COLEMAN, WILLIAM D	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 12/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/602,191

Applicant(s)

KRUEGER ET AL.

Examiner

W. David Coleman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 03/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed March 31, 2004 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al., U.S. Patent 6,710,358 B1.

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5. Chen discloses a semiconductor process as claimed. Please see **FIGS. 1-3b** where Chen teaches the claimed invention.

6. Pertaining to claim 1, Chen teaches a method, comprising:

operating an implantation tool with a first species including a first dopant (p-type, column 2, lines 50);

operating said implantation tool with xenon (column 2, lines 27-40) as an implant precursor to reduce residues of said first species in said implantation tool; and

operating said implantation tool with a second species including a second dopant (n-type, column 2, line 50).

7. Pertaining to claim 8, Chen teaches the method of claim 1, further comprising purging and evacuating said implantation tool at least once prior to operating said implantation tool with said second species.

8. Claims 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Shubaly, U.S. Patent 4,714,834.

Shubaly discloses a semiconductor process as claimed. See **Table 1** below, where Shubaly teaches the claimed invention.

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TABLE I					
Beam Currents with Various Gases					
Feed Gas	Arc (A)	1 Aperture Beam (mA)	Port in the Anode Insert	Current of Sample Species	
				3-Aperture	7-Aperture
Phosphine + Xe	8	48	lower	P <sup>+</sup> 25 mA	38 mA
Phosphine + Ar	8.5	40	lower	P <sup>+</sup> 15 mA	35 mA
Arsine + Xe	7.5	40	lower	As <sup>+</sup> 13.6 mA	32 mA
Boron	7.5	38	upper	B <sup>+</sup> 6.4 mA	14.9 mA
Trifluoride + Ar	9.5	48	lower	BF <sub>3</sub> 26.2 mA	63 mA
Oxygen + Ar	10.5	100	lower	O <sup>+</sup> 60	140
Nitrogen	12	190*	fed through primary gas inlet	not mass analyzed	
Hydrogen	14	430*	fed through primary gas inlet	—	H <sub>1</sub> <sup>+</sup> 350 mA
Argon	13	155*	fed through primary gas inlet	—	A <sup>++</sup> 130 mA A <sup>+</sup> 5 mA
Xenon	10	99*	fed through primary gas inlet	—	Xe <sup>++</sup> 96 mA Xe <sup>+</sup> 3 mA
Neon	14	91*	fed through primary gas inlet	not mass analyzed	

\*subtract from 7 apertures

9. Pertaining to claim 13, Shubaly teaches a method of doping a substrate, the method comprising:

operating an implantation tool with xenon as the implantation species prior to installing said substrate in the implantation tool to reduce contaminating particles; and  
operating said implantation tool with the substrate mounted therein to implant a first species of dopants in the substrate.

10. Pertaining to claim 14, Shubaly teaches the method of claim 13, further comprising operating said implantation tool with a second species other than said first species prior to operating said implantation tool with xenon.

11. Claim 23 is rejected under 35 U.S.C. 102(e) as being anticipated by Yu, U.S. Patent 6,521,502 B1.

12. Pertaining to claim 23, Yu teaches a method of doping substrates, the method comprising:

mounting a substrate in an implantation tool;

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operating said implantation tool with a first species (n-type, column 4, lines 42-43)) of dopants to implant said first dopant into a crystalline region of said substrate;

operating said implantation tool with xenon (column 5, lines 35-48) as the implantation species to substantially amorphize a portion of said crystalline region; and

operating said implantation tool with a second species of dopants to implant said second dopant into said substantially amorphize portion.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 2, 3, 4, 5, 6, 7, 8, 9, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 6,710,358 B1 in view of Yu, U.S. Patent 6,521,502 B1.

15. Chen discloses a semiconductor process substantially as claimed as discussed above in claim 1 above. However, Chen fails to teach the following limitations.

16. Pertaining to claim 2, Chen fails to teach the method of claim 1, wherein said first dopant comprises at least one of arsenic, indium and antimony. Yu teaches the method wherein the first dopant comprises arsenic, indium and antimony (column 4, lines 42-43). In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the dopants of Yu into the

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Chen semiconductor process because these are dopants for an n-channel MOSFET (column 4, lines 42-47).

17. Pertaining to claim 3, Chen fails to teach the method of claim 2, wherein said second dopant comprises one of boron and phosphorus. Yu teaches the method wherein the second dopant comprises one of boron and phosphorus. In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the dopants of Yu into the Chen semiconductor process because these are dopants for an n-channel MOSFET (column 4, lines 42-47).

18. Pertaining to claims 4, 5, 6 and 7, Chen fails to teach the limitations of the energy range, dopant concentration of the xenon and time interval. Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

19. Pertaining to claim 9, Chen fails to teach the method of claim 1, wherein operating said implantation tool with said first species includes implanting said first dopant into a semiconductor region of a substrate to form one of a well profile and a halo profile for a transistor structure. Yu teaches wherein operating said implantation tool with said first species includes implanting said first dopant into a semiconductor region of a substrate to form one of a well profile and a halo profile **24** for a transistor structure (the Examiner takes the position that a CMOS device requires a well, which is inherent to CMOS devices). In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the limitations of Yu into the Chen semiconductor process because controlling short channel effects is important to assuring proper semiconductor operation (column 1, lines 56-65).

20. Pertaining to claim 10, Chen in view of Yu teaches the method of claim 9, wherein operating said implantation tool with said xenon includes implanting xenon ions into said semiconductor region to amorphize a portion thereof.

21. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 6,710,358 B1 in view of Shubaly U.S. Patent 4714,834.

22. Pertaining to claim 11, Chen fails to teach the method of claim 1, wherein operating said implantation tool with said xenon is performed without a substrate placed in said implantation tool. Shubaly teaches wherein operating said implantation tool with said xenon is performed without a substrate placed in said implantation tool. In view of Shubaly, it would have been



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obvious to one of ordinary skill in the art to incorporate the semiconductor process of Shubaly because xenon is used to protect the filament (column 10, lines 46-57).

23. Pertaining to claim 12, Chen in view of Shubaly teaches the method of claim 1, wherein operating said implantation tool with said xenon is performed with a substrate that has not been exposed to said first species. See Table 1 of Shubaly where xenon is performed with a substrate that has not been exposed to said first species. In view of Shubaly, it would have been obvious to one of ordinary skill in the art to incorporate the semiconductor process of Shubaly because xenon is used to protect the filament (column 10, lines 46-57).

24. Claims 15, 16, 17, 18, 19, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shubaly U.S. Patent 4,714,834 in view of Yu U.S. Patent 6,521,502 B1.

25. Pertaining to claims 15, 16, 17, 18, 19 and 21 Shubaly fails to teach the method of claim 13, wherein said first dopant comprises at least one of arsenic, indium and antimony. Yu teaches the method wherein the first dopant comprises arsenic, indium and antimony (column 4, lines 42-43). In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the dopants of Yu into the Shubaly semiconductor process because these are dopants for an n-channel MOSFET (column 4, lines 42-47).

26. Pertaining to claim 16, Shubaly fails to teach the method of claim 13, wherein said second dopant comprises one of boron and phosphorus. Yu teaches the method wherein the second dopant comprises one of boron and phosphorus. In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the dopants of Yu into the Shubaly semiconductor process because these are dopants for an n-channel MOSFET (column 4, lines 42-47).

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27. Pertaining to claims 17, 18, 19, 20, 21 and 22 fails to teach the limitations of the energy range, dopant concentration of the xenon and time interval. Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) “It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

28. Pertaining to claims 24-26, Yu fails to teach the limitations of the implant energies, concentration. Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) “It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either

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the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

29. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu U.S. Patent 6,521,502 B1 in view of Shubaly., U.S. Patent 4,714,834.

30. Yu fails to teach prior to amorphizing said portion, operating said implantation tool with xenon when said substrate is removed from said implantation tool to reduce residues of said first species. Shubaly teaches operating said implantation tool with xenon when said substrate is removed from said implantation tool to reduce residues of said first species. In view of Shubaly, it would have been obvious to one of ordinary skill in the art to incorporate removal of the wafer from the implantation tool to reduce residue of said first species (the Examiner takes the position that a wafer is not required in the Shubaly implantation tool to run the xenon).

### ***Conclusion***

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 571-272-1856.

The examiner can normally be reached on 9:00 AM-5:00 PM.

32. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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33. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



W. David Coleman  
Primary Examiner  
Art Unit 2823

WDC